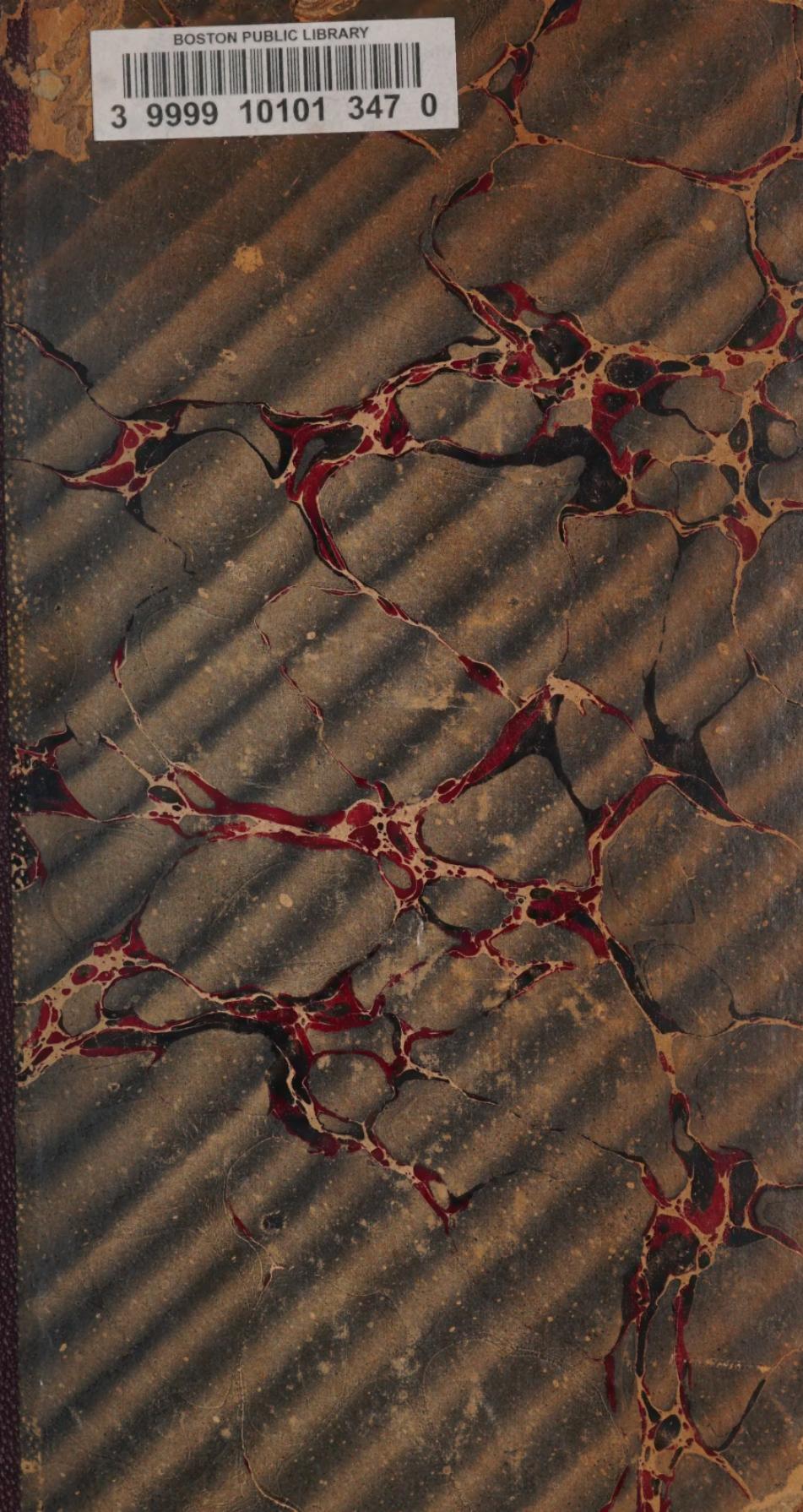


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AND HERTFORDSHIRE FIELD CLUB,

On the 8th of February, 1877.

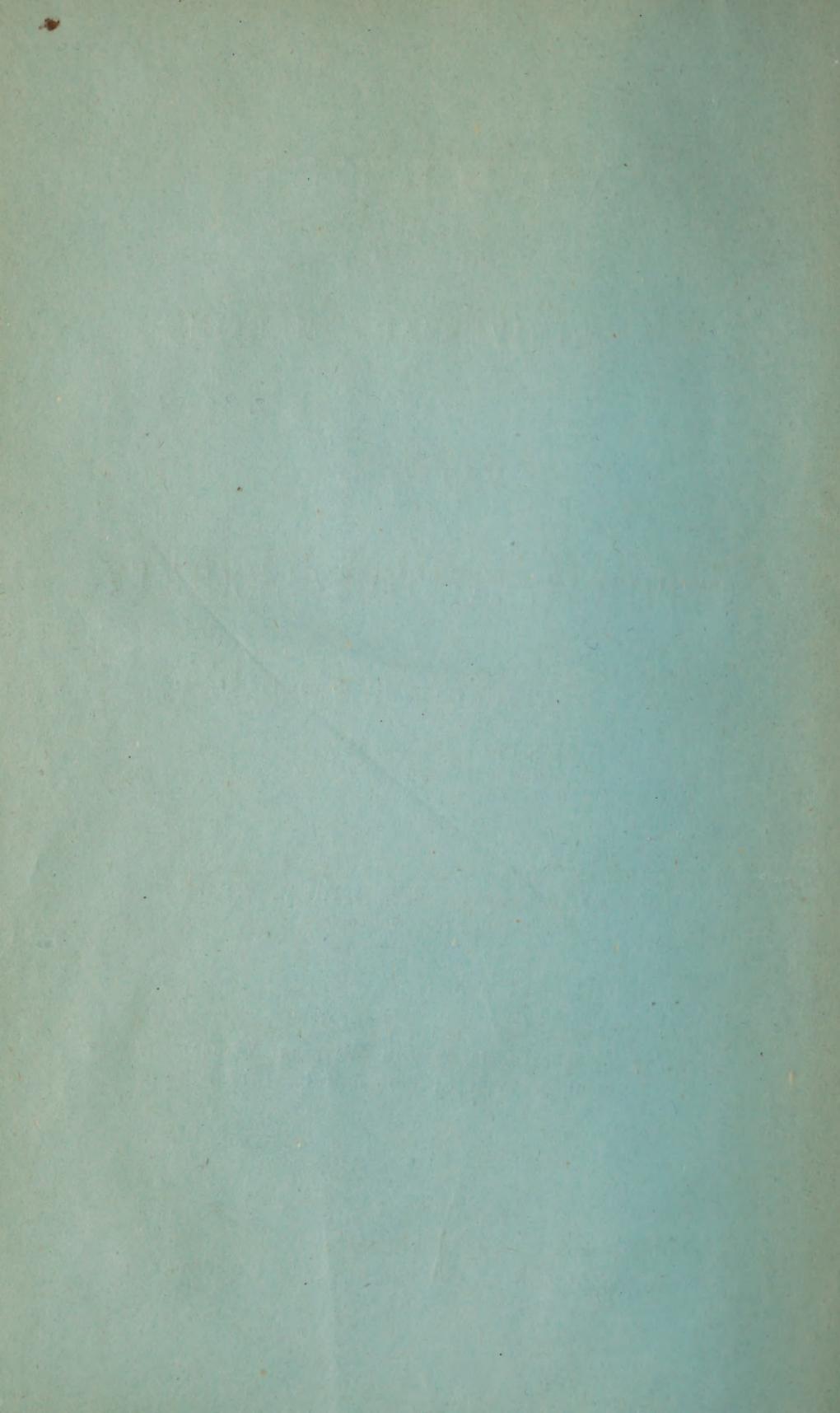
BY JOHN EVANS, Esq., F.R.S., V.P.S.A., V.P.G.S., ETC.,
PRESIDENT OF THE SOCIETY.

[*From the "TRANSACTIONS OF THE WATFORD NATURAL HISTORY SOCIETY," Vol. I., Part 7, July, 1877.]*

HERTFORD:

STEPHEN AUSTIN AND SONS, PRINTERS, FORE STREET.

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ANNIVERSARY ADDRESS.

LADIES AND GENTLEMEN,—

I am now, as President, called upon to deliver an Anniversary Address, though I regret that I am not able to present to you much that will be worthy of attention, as I have not had time to prepare anything in a written form. Before proceeding to treat of any particular subject, I think I may fairly congratulate the Society, as the Council has already done, on the progress it has made during the first two years of its existence. It is indeed now fully established, and has been and is doing good work. When we look back at the Proceedings of the past year, we see that we have had a series of papers communicated to us of greater or less importance on those different Natural History subjects to which we ought to devote our principal attention. We have had interesting papers on Phenological Phenomena, and on the Botany of the Ermine Street, by Lieutenant Croft; another paper from the northern part of the county, by Mr. Fordham, on the supposed extinction of *Cyclostoma elegans*, the most beautiful of the British land-shells, and comparatively abundant in this part of the county. We have had papers on *Anacharis alsinastrum* in the Colne; on Fish-culture in Hertfordshire, the River Colne, the Cuckoo, and other minor subjects, from Dr. Brett. We have also had some Entomological notices, on the Larvæ of the Goat-Moth, from Mr. J. H. James, and on the Oleander Hawk-Moth, a very rare moth in this country, from Mr. Fry. Mr. Pryor, who is distinguished as a botanist, not only here but elsewhere, has communicated to us a list of plants found in new situations in the neighbourhood of Watford, and has also called attention to the late blossoming of certain spring flowers which bloomed in October and November, as well as early in the spring. But, perhaps, we may especially congratulate ourselves on one of our members—a lady member, Miss Willshin—having discovered the *Campanula latifolia* in the neighbourhood of St. Albans, and also a new variety of a thistle and a heath. With regard to another subject—Meteorology—we have had the records of several observers communicated to us; and from the Report of the Council, it appears that we are likely to have

a succession of Meteorological Observations kept in this county. Geology has had—partly, I imagine, owing to the geological propclivities of your Secretary, and possibly of your President—a very fair amount of attention shown it during the past year. We have had an admirable lecture on “The Eocenes of England and their Extension in Hertfordshire,” by Mr. Lobley; we have had a notice of the “Hertfordshire Ordnance Bench Marks,” by Mr. John Hopkinson; an account of some “Boulders near Buntingford,” by Mr. R. P. Greg; and, what is of more immediate interest to the inhabitants of this part of the county, a paper on “The Geology and Water Supply of the Neighbourhood of Watford,” by the Rev. James C. Clutterbuck. I have also communicated a short paper on “The Hertfordshire Bourne,” and “Notes on Earth Pyramids in the Neighbourhood of Botzen in the Tyrol.” In addition to all this, you have had two excellent lectures “On the Polarisation of Light,” from Mr. Harford; notes on “Microscopical Mounting,” by Mr. Cottam; and hints for a new field naturalist’s microscope, by Lieutenant Croft. I think that this list shows that we have been extending our operations over a very considerable field, and I hope with satisfactory results.

In the Address which I had the honour of delivering last year, I pointed out the various branches of inquiry which seemed to me to come within the field of such a society as this; and it appears to me that I did enough on that occasion in the way of indicating the methods which might be adopted, and the subjects which required investigation; for we shall all agree that there is still a great deal to be done by the Society before all the fields then pointed out may be considered to have been fully explored. I therefore thought that on this occasion it was not worth while to give an address in any way similar in character to that which I gave last year. It next occurred to me whether it would be possible to give some account of the advances made last year in Natural History generally; but although we have had an Arctic Expedition, and other Expeditions undertaken with the view of bringing within our knowledge a greater amount of the Natural History of various parts of the world than has been before obtained, yet, to make an address adapted for a society of this kind would have required considerable more time, and perhaps ability, than I was able to bestow upon it. I then considered whether it was possible that any of the recent works on Natural History that have issued from the press would afford me material on which to speak to you. It crossed my mind whether the works of Mr. Darwin on Climbing Plants, and on Cross-fertilisation, or any other of his admirable

books, would afford me foundation for an address; but I thought that, after all, it was preferable for those who take an interest in Science to read the works themselves, to hearing a garbled report of them second-hand. I therefore felt that I must take up some other subject; but before I proceed, I may just mention one point to which I alluded in my last address, that was curiously illustrated in our Church decorations of last Christmas.

Every one must have noticed the remarkable absence of holly berries in this district, and the same scarcity was felt over a considerable portion of England. The question arose, "How is it that holly berries are so scarce?" It was attributed by some persons to the early frosts; but I for one expressed an opinion that it was due to a want of certain insects in the spring; and I am glad to perceive that in a letter addressed by Mr. Darwin to the 'Gardener's Chronicle,' he bears out entirely that view. He points out that the holly is what is known as a diœcious tree—that is, there are separate male and female plants,—and it is requisite that the pollen from the one shall be brought to the other before the flowers are fertilised to produce seed. This is done generally by means of bees, as he has ascertained by actual experiment some years ago. It appears, therefore, that the absence of holly berries arose from the deficiency of bees. Mr. Darwin also observed, in looking over the clover fields which were in flower in his neighbourhood, that there was there also comparatively a small number of humble-bees; and it crossed his mind whether—in consequence of this—there might not prove to be some failure in clover seed, as clover is mainly fertilised by means of humble-bees. Curiously enough, he subsequently received a letter telling him that there *was* a deficiency in clover seed, and farmers could not understand why the seed had not set. I do not know whether the clover seed was affected to any great extent in this neighbourhood; but there is no doubt this is one of those cases in which "great effects from little causes spring," and that the presence or absence of a few insects affects the prosperity of farmers and others engaged in agricultural pursuits. As Fuller observes of our Hertfordshire Pope, Adrian the Fourth, who was choked by a fly—"Anything next nothing, be it but advantageously planted, is big enough to batter a man's life down to the ground." No doubt the absence of his seed-crop is not equal to the battering down of a farmer's life, but still it may materially affect him.

But to return from this digression. I was saying that I found a difficulty in deciding what would be best adapted to speak upon this evening. I thought probably that you would have had during this year almost enough of purely geological subjects. It then

struck me that possibly something in connexion with Archæology might be of interest to you ; but then I considered that this Society is a Field Club of Naturalists, and does not include any branches of Archaeology within its province. In many counties, however, Field Clubs and Naturalists' Societies study Archæology. I think that even we have ventured into churches, and found that they added interest to what was an interesting excursion in connexion with Natural History. Archæology, after all, appears to me but a branch of the natural history of man, which of course comes within the range of our inquiry ; and when we get beyond the domain of written records, and attempt to study primeval man, his antiquity and early history,—when, indeed, we have to trust to monuments alone,—the study of Archæology must, to a certain extent, follow the methods of Natural History, and may be regarded as a branch of it. Your Secretary, moreover, suggested to me that I might say this evening something with regard to that border province between Geology and Archæology in which we find the earliest traces of man on the globe. Acting on his advice, I have brought here a few implements found under peculiar geological conditions, about which I shall have to speak to you ; and I propose giving you some account of the discoveries made in the province known as Archæo-geology, and offering you some few remarks with regard to the antiquity of man in this and other countries, and the geological formations in which the discoveries of the last twenty years have been made.

All of you are aware that the history of man has been divided into different Periods—that is to say, that of late years it has been the habit to speak of an Iron Period, a Bronze Period, and a Stone Period, and, possibly, of subdivisions of these periods. The use of this general classification is, I think, evident ; because, though strictly speaking during the Iron Period bronze and stone were not excluded, and though during the Bronze Period stone was not absolutely disused, yet there is a great distinction between the people who were in so low a stage of civilization that they used stone instruments only, and those who were acquainted with the use of metal. We live in the Iron Age or Steel Age ; but some 2000 years ago, say 300 or 400 years b.c., the knowledge of iron was extremely limited in this country ; and instead of iron the ordinary tools and weapons were made of brass, or strictly speaking bronze, that is to say, formed of a mixture of copper and tin, and not of copper and zinc. Not only do we find, in examining the reliques which have come down to us, an evident development from the forms in one metal to those in another ; but in history there

are traces of the use of bronze before that of iron. In the time when the Homeric poems were written, iron was extremely rare, and the weapons were of copper or bronze; and it will be very interesting, when we see the results of Dr. Schliemann's explorations at Mycenæ, to observe how far the weapons and other ornaments which have been found there correspond with what may be supposed to have been the arms and ornaments in use when the scenes of the Homeric poems were laid. It is a remarkable fact that in these tombs of Agamemnon, or other royal personages at Mycenæ, no traces of iron have been found, but the swords and other weapons are of bronze. There are also found ornaments of gold, and pottery, some of very fine manufacture, and some stones or gems which have been admirably worked—showing that the absence of the knowledge of iron is not incompatible with a certain high degree of civilization. As further evidence of the succession of iron to bronze, we find traces of the use of bronze surviving in religious rites, where the earlier form of sacrificial instruments was preserved after iron had come into use for other purposes, and for some religious rites stone instruments have also prevailed even into the Iron Period. We know, also, that during the Bronze Period in this country, while bronze was in use for knives and other articles, arrow-heads were still made of flint, probably because they were liable to be lost, and flint was cheaper than metal. We find, too, that stone battle-axes were in use after the period when bronze was introduced for the formation of daggers. In a similar manner we find bronze overlapping beyond the introduction of iron; so that generally we have the three divisions shading off one into the other, as I have elsewhere remarked, like the principal colours of the rainbow.

It must never be forgotten that these so-called ages are simply indicative of different stages of civilization, and are not of any chronological value. It does not by any means follow that when the inhabitants of this country were in their Stone Age, the inhabitants of Greece were also in it at the same time. In all probability, while the inhabitants of the south of Europe were using bronze and even iron, the inhabitants of the north still used stone for their cutting tools and other weapons. At the present time we find many savages who—although we are thoroughly in our Iron Age, in almost too full development—are still in their Stone Period; and I have brought some specimens to show the kind of tools in use among savages of the present day, by way of illustration of those of ancient date which we find in this country. Here, for instance, is a stone axe from Polynesia, bound to its haft by a piece of cord,

showing a very simple form of mounting an axe. Here is another from New Caledonia, showing how far the development of art had gone while stone was still in use. The blade is inserted into a wooden socket, bound round in the most artistic way to prevent it from splitting, and attached to a stout handle in a very ingenious manner.

In tracing back our antiquities in this country, we also come to a period when nothing but stone was in use for cutting purposes. We find, for instance, hatchets made of stone carefully ground to an edge, and shaped in a similar manner to those in use in New Guinea and various islands of the Pacific. These belong to the Polished Stone Period, or Neolithic Period—the period which preceded the use of bronze. Now we know that at the time of Julius Cæsar, iron was already beginning to be known in Britain, and bronze was dying or had died out of use. The use of bronze in this country probably extended over about a thousand years, which would give a date of 1000 or 1200 B.C. for the more recent of the ordinary stone instruments. How much further back their use might be carried it is impossible to say; but however far back, we find they belong to what must be regarded as a comparatively recent period, when compared with the period in which certain other implements were made. The later or Polished Stone Period received the name Neolithic (New Stone) or Surface Period, from these things being found on the surface; and the other the Palæolithic (Old Stone) or Drift Period, inasmuch as the implements were found, as a rule, not on the surface, but in deposits of a late geological age, and associated with animals in many cases not living in the districts at the present time, but which are either extinct or have migrated from the places where they originally lived. It is with regard to this Palæolithic Age that I am going to say a few words this evening.

The Palæolithic instruments may be roughly divided into two classes—those found in caves, and those found in the gravels. There is some difficulty in ascertaining the relative chronology of these two classes of deposits; but in all probability many of the caves belong to a more recent period than the older of the gravels. But with regard to the question of chronology I shall have more to say when I get further into the subject.

The fact of the association of man with the extinct animals in cavern deposits is by no means a new one. It has been treated of by Tournal, Christol, Schmerling, and others in France and Belgium; and about fifty years ago Mr. MacEnery also observed it in Kent's Cavern, in Devonshire, though induced to suppress

his discoveries to a certain extent by the late Dr. Buckland. But in late years a vast number of these caves have been explored, and they throw a great amount of light on the character of the inhabitants of Europe at the period when they were occupied. We find that in the south of France men were in the habit of living, not so much in actual caves, as in shelters below rocks—that they fed on reindeer, which have now disappeared from that part of the globe, on horses to a certain extent, and oxen and deer, whose bones we find broken up; and mixed with these bones, the instruments of which they made use. They seem to have been, like the Esquimaux, devotedly attached to marrow, for almost every bone is smashed. In the hammers with which they smashed the bones, the flint tools with which they fashioned their harpoons and other instruments made from the horns of the reindeer, the stones, heated probably for boiling water, we find the whole history of their method of life. I have brought here a few arrow-heads, lance-heads, and deer-horn harpoons, round-ended instruments known as scrapers, and one or two other objects. With regard to the scrapers, it is curious that in the present century the Esquimaux were using similar instruments as planes for working wood, and sometimes as scrapers for the inner side of skins. But not only have we the instruments with which the Cave-dwellers prepared their leather, but the needles with which they sewed the skins together. You will see that the needles are not quite so fine as our own, but still very fine when you consider that they were made by means of flint tools only. The late Dr. Falconer tried to make some bone needles like them without the present modern appliances, using only flint tools, and he succeeded perfectly. In one corner of the case before you, you will see a piece of haematite, or iron ore, of a reddish colour, which has been scraped. There is very little doubt that at that time the savages were given to ornament and colour very much in the same manner as at the present day, and the red stone was used to produce paint. They may even have put on war paint when going into battle. The caves seem to vary considerably in age; but any dissertation on their chronology would be out of place here. I will, therefore, not trouble you beyond saying that in all probability there were four successive ages of caves, and the tools found in the earliest of these approximate most nearly in form to those found in the river gravels. By way of illustrating the great distinction in time there must have been between the period of the cavern people, when reindeer formed the staple article of food, and the more recent Neolithic Period, I may mention that in the neighbourhood of the Swiss Lakes, where so many articles

of the Neolithic Stone Period have been found, there is a cave at Mont Salève, near Geneva, where reindeer remains occur with instruments like these ; while in the lake dwellings of the Polished Stone Period, reindeer are entirely absent. Of our English caverns, the principal is Kent's Cavern, near Torquay, undergoing exploration by a Committee of the British Association, of which Mr. Pengelly and Mr. Vivian are the most active members. In that cave a number of remains of extinct animals have been found, associated in a few cases with instruments like those from the French caves, including barbed harpoons of reindeer horn. In a lower deposit, beneath large masses of stalagmite, there have been found a certain number of stone instruments of the same character as those which have been found in the river gravels. Much the same class of remains, that is to say, bones of extinct animals side by side with implements fashioned by the hand of man, were found in a cave near Wookey Hole, explored by Mr. Boyd Dawkins some years ago.

I think that I have now said enough to you with regard to the cave instruments to show that the fauna with which they are associated is distinct in its character from that which belonged to the ordinary Stone Period. I now turn to those found in old river drift—that is to say, in gravels which appear to have been deposited in old river-beds by water flowing at a higher elevation than that at which the rivers now flow. It is only of late years that much attention has been called to these deposits. M. Boucher de Perthes, in 1846, was the first who published any account of the instruments found in the gravels of the River Somme, and he was followed up by Dr. Rigollot at Amiens. In 1858 Dr. Falconer visited M. de Perthes' collection, and mentioned the subject to Mr. Prestwich. In April, 1859, Mr. Prestwich and I visited the spot, and satisfied ourselves as to the authenticity of M. Boucher de Perthes' discoveries.

The discoveries have since been multiplied to a very great extent, and now there is hardly an important river-valley in France in which such implements have not been discovered. Researches which have extended over the greater part of southern England have also been well rewarded. With regard to the beds of Amiens, I may give you some short account of them as typical examples of the nature of the beds in which these instruments occur. At the surface you have a varying depth of from nine to ten feet of brick earth, gravelly at its base, containing but few fossils; but from time to time there are found imbedded in this brick earth implements of flint, which, though whitened by age, have not undergone any

process of rolling, but retain their edges as sharp as on the day they were made. Below there is a silt, in which is found a considerable number of species of river-shells and some land-shells; and below that again (the thickness of the silt being six or seven feet, and there being often seams of gravel intermixed in it), is found a bed of coarse, and in some cases finer gravel, five or six feet thick, in which implements more commonly occur, as forming constituent parts of the gravel itself. The late Mr. Flower, of Croydon, dug out, from a depth of twenty feet, a well-formed instrument, which he bequeathed to my collection, and I have myself extracted some from about the same depth at Amiens, which were pointed out to me *in situ* by the workmen.

After the discoveries at Amiens and Abbeville became known, Mr. Prestwich and I thought that in all probability there were places in this country where such instruments ought to be discovered, and we visited many places which, from analogy, appeared likely to produce such implements, amongst which were Bedford and Salisbury; but our search was unsuccessful. Attention, however, having been directed to the subject, and the gravel-pits carefully searched by geologists living on the spots, flint implements were eventually found associated with the same mammalian fauna as that of the valley of the Somme, and with fresh-water shells nearly similar to those at Amiens. In the valley of the Lark, in the valley of the Little Ouse and Waveney, in the valley of the Thames at Acton and Ealing, and in several other river-valleys, they have also now been discovered.

Further down the valley of the Thames, at Reculvers, in the neighbourhood of Herne Bay; in the south of England, at Southampton, and other places along the south coast, these things have also been found. Perhaps one of the most curious of these discoveries is that at Southampton, and along the southern shores of the counties of Dorset and Hampshire. There you have a cliff now close to the sea, which is capped with gravel at something like 90 feet above high-water mark, and in this gravel these implements have been discovered.

It is not a little remarkable that, in addition to their occurring, as I have pointed out, in France and England, and also in Spain and other parts of Europe (but not generally throughout Europe), they are found in the East Indies in beds of laterite of great antiquity.

Having now mentioned some of the places where these implements have been found, and having alluded to the circumstances under which they have been discovered, it will be well to say a

little with regard to the character of the implements. First of all, the simplest form is a mere flint "flake," as it is termed—a piece dislodged from the flint by a single blow, with a sharp edge on each side, being a tool valuable for various purposes. As an instance of the modern use of these flakes, I may tell you that at the time of the Spanish conquest of Mexico, the natives shaved themselves with flakes of obsidian. So readily were they made that it was easier to make a new one than to sharpen and go on shaving with the old one. Knives constructed in that very simple manner have been in use all over the world among savage tribes. Among other places I may mention Queensland, Australia, where knives are usually made of basalt, the handle being of kangaroo skin, attached by gum to the butt end, thus forming a knife that is very serviceable, although of the rudest possible construction. As an instance of the effect of the contact with civilization on the construction of these instruments, I may say that, having a friend in Queensland, I requested him to procure me one of these knives, and he sent me one. It is made of a beautiful transparent material, with the handle tied on and coated with gum; but I find, on examining it, that, instead of its being kangaroo skin, it is a piece of coarse Manchester cotton. Though the gum is there, the string which holds it on is probably of European manufacture, and the blade is merely the fragment of a gin-bottle. No doubt it is a better purpose to which to apply gin-bottles than those to which they are generally applied; but it is a very curious result of the approach of civilization to a barbarous people, who made use of the material brought to them in converting it to what we may call a non-natural purpose. On the coast of America old porter-bottles have been used as a material for arrow-heads.

To return to the various forms of instruments found in the river-gravels. There are various pointed tools adapted to be held in the hand. Some are oval-shaped with a sharp edge all round; others nearly round, and in other cases they are almond-shaped. These are, generally speaking, the forms in which they occur. As to the purposes to which they are applied, it is almost impossible to determine, though in all probability the bulk of them were used for much the same purposes as we use the knife and axe. It has been suggested that some were used for cutting holes in the ice for fishing, or grubbing holes in the earth for roots, and for killing animals, and it is impossible to say what they have not been used for. All I have to say is that I agree with Professor Ramsay that they are instruments as distinctly worked by the hand of man, as a Sheffield whittle is at the present day.

The earliest discovery of the instruments of which any record has been kept, took place in 1699 or 1700, in Gray's Inn Lane, in London, when an implement was found associated with the remains of an elephant. At that time there were no questions raised as to the antiquity of man, and no doubts were thrown on the discovery, the instrument being supposed to have been used by a Briton to kill an elephant which had been imported by Cæsar. Subsequently, at the end of the last century, Mr. Frere communicated a notice to the Society of Antiquaries, giving an account of the discovery of a number of these tools at Hoxne, in Suffolk, and stating that they were found in a brick-pit with the remains of large animals, and under such circumstances as to make it appear that they belonged to what he called "another world." I myself have carried out some explorations in that pit, and here is the butt end of one of these instruments, which I saw thrown out from a depth of eight feet of undisturbed gravel. That gives you an idea of the great amount of accumulation found in some cases over these instruments. In other cases they are found upon the surface. Here is one I found on the surface between Abbot's Langley and Bedmond. Here is another from Nash Mills. I found it within a quarter of a mile of my own house on some gravel that was being used for repairing the towing path, which I think had been dredged from the bottom of the valley.

The levels at which these implements occur are usually far beyond the reach of existing floods. In the case of Highbury, near London, one was found nearly 100 feet above the Thames; and at Ealing they occur something like 90 feet above the river; but it is impossible to suppose that at any period the floods of the Thames in its valley, as at present existing, reached to such a height; and even if they did, that they could have deposited the veins of gravel in which the implements occur, and, in addition to these, the beds of sand and brick-earth above them.

Then the question arises, in what manner can we satisfactorily account for the deposits in which the implements are found? As I said before, they appear to be drift deposited by the action of rivers, following much the same courses as the rivers of the present day, but flowing at a different level, and it is from the conditions under which they are deposited, and the associated fauna, that we make some inferences as to their antiquity. I have already said that with them have been found the remains of the mammoth, and in addition there is the rhinoceros, the cave-lion, the hippopotamus, and other animals no longer living in this country, and which had become extinct or had migrated by the time the beds were de-

posited which now form the bottom of our valleys. Such a change in the fauna must be significant of a great lapse of time.

And there is another feature in the case. In nearly all instances there is a great similarity in the deposits in which the implements occur, and in the localities in which they are found. The beds cannot be due to any great cataclysm or wave traversing the country, because the materials of which the gravels are formed are confined to the valleys through which the rivers now pass. For instance, if there were such beds in the valley of the Colne, you would only in these gravels get pebbles derived from the Chalk or Tertiary beds above, including, however, the Glacial beds, in which the older rocks occur. In France, in the gravels of rivers which have passed through granitic districts, there are found granitic pebbles; whereas where the rivers do not traverse granitic districts, no such pebbles are to be seen. Other and conclusive evidence of the gravels having been deposited by the action of rivers is afforded by the presence of fresh-water shells. We are therefore driven to the conclusion that they were deposited by rivers flowing from much the same watersheds as at present, but at a very different elevation. One theory was that the valleys had already been excavated in pre-glacial times and subsequently re-excavated. But in this there is a difficulty, because it is very doubtful whether in certain soils it was not easier for the rivers to cut out new valleys than for them to excavate the beds which had been deposited in glacial times. I think, therefore, that this was not the case, but that the valleys, even when in existence in a shallower form in pre-glacial times, have been cut much deeper in post-glacial times by the rivers which have flowed through them. We can hardly form an estimate of what the old rivers were like when they received a much greater amount of rainfall than at present, and were left in a state of nature. Indeed, if the rainfall were increased to a not immoderate extent, all the conditions of the case would be altered, especially in Chalk districts, in which these implements have been mainly found. If, for instance, instead of the level of saturation being 70 or 80 feet below the surface, as in this district, the rainfall saturated the Chalk to the top,—which would not require a very excessive amount,—the rain falling on the saturated surface would act in the same manner as if falling in a clay country, and there would be enormous floods in districts where they are now unknown. I think this is one of the reasons which conduced to the formation of valleys of such depths by streams which at present appear so inadequate to the work which we have every reason to believe they performed.

A river, assuming that it were liable to floods of this kind, would constantly scour out its bed,—deepen it by transporting the materials to the sea, or by removing them and depositing them in fresh places. In that manner small portions of the original bed of the river which had escaped the action of succeeding floods would be left as land-marks at the side of the valleys at a far higher level than the beds now being formed at the bottom of the valley—in fact, the old river-bed would be cut through and small portions left as memorials of its existence at high levels. That such is the case with the gravel-beds now 90 or 100 feet above the streams is also borne out by the fact that above the gravels we find the fine silt or brick-earth already mentioned. Gravel can only be carried by water flowing with considerable velocity. Where the velocity is not so great, it is deposited; where water flows slowly, sand falls to the bottom; and where it is nearly stagnant, turbid water will deposit mud. All these deposits might be formed at the same time, the gravel along the bed of the main stream, and silt and mud at spots only accessible by flood-waters. At the period when the rivers ran at a high level, the bottoms of the valleys were probably much wider than at present, and you may readily conceive how from any meandering of the streams from one side of the valley to the other, parts of the old bed were left at some distance from the main stream, which were liable to receive a coating of sand, and subsequently, as the river got further away, were merely exposed to the almost stagnant waters of floods, and received a coating of brick-earth.

And not only have we the evidence of this great deepening of the valleys, which must have required an enormous amount of time; but we have that curious feature, to which I have already alluded, of gravels of fresh-water formation capping the cliffs on the south coast of England. At Bournemouth the cliffs are about ninety feet high, with this gravel above, and, judging from analogy, we cannot but regard it as having been formed in the bed of a river. But the southern side of the valley through which that river flowed has now entirely disappeared, and in order to reconstruct the country through which it flowed, you must regard the great range of Chalk hills which passes through the Isle of Wight as being continuous to Ballard Down, near Corfe Castle, and fill up the great bay between Studland and the Isle of Wight with one hundred square miles of high ground sloping to the north.

That this was in all probability the early condition of that part of England, and that the capping of the cliffs at Bournemouth is merely the bed of an ancient river, is shown by

the fact that between the Isle of Wight and the mainland there exists a channel, the Solent Sea, which seems to be only a portion of the old river that flowed by Bournemouth, widened out. You can easily imagine that when once the sea had made a breach in the land so as to intersect the course of that old river, it would in process of time widen it out. Looking at the fact that all along the shores of Southampton Water we find gravel with these implements, showing that a great branch river flowed southwards into the Solent, and that along the northern sides of the Solent Sea we have gravels capping the cliffs at Barton, also with implements, and that on the opposite side of the Solent these implements have likewise been found, near the Foreland in the Isle of Wight; I think there is good evidence for regarding that Solent Sea, which is now a great highway for the British Navy, as having been only a portion of a river, at a time when this part of the world was already occupied by man. It is not a little remarkable that at Southampton Common, where we get these gravels, they occur at 150 or 160 feet above high-water mark. Here is an implement said to have been found at 180 feet, but certainly at above 140 feet. Its edges are not sharp, but are waterworn, showing that it has been subject to the abrading action of water.

But I am afraid I have detained you full long upon this interesting subject. You may ask, probably, what antiquity is to be assigned to these objects, and I frankly say I cannot tell you. You must imagine to yourselves the amount of time required for a river having a watershed or basin of the same area as the existing River Thames to excavate the valley in which London now stands, some three miles in width and 80 feet in depth, and add to the period which would be necessary for this to be effected, the whole of the Stone, Bronze, and Iron Periods which are embraced in ordinary history. You must for yourselves reconstruct the map of England, and connect the Isle of Wight with the mainland; and picture to yourselves the amount of time requisite to wash away the whole of the southern part of the valley of the River Solent and widen out the course of the stream where is now the Solent Sea. If you are mentally able to conceive the amount of time which would be necessary for producing such effects, I think that you will agree with me that the antiquity of man is something which requires strong powers of the imagination to realize.

